operate in different spatial representations of the perturbation position(s). The normalized coordinate representations are then output **3229**. The perturbation analysis is a continuous process, analyzing each significant perturbation. Thus, the processes set forth in FIGS. **32**(a)(**1**), **32**(a)(**2**), **32**(*b*) and **32**(*c*) may proceed independently and asynchronously, except where data from one process is required for operation of the other process.

[**0570**] The present invention therefore extends the field of acoustic touchscreens by describing such systems which innovate the mechanical construction, receiver electronics and or logical processing systems, for the purpose of providing, among other advantages, increased flexibility in packaging and configuration, improved performance, and the ability to process multiple perturbations simultaneously. It should be understood that the preferred embodiments and examples described herein are for illustrative purposes only and are not to be construed as limiting the scope of the present invention, which is properly delineated only in the appended claims.

What is claimed is:

1. A touch sensor comprising:

an acoustic wave transmissive medium having a surface and a touch sensitive portion of said surface;

a transducer system for emitting acoustic energy into said medium; and

a receiver system for receiving the acoustic energy from the substrate as at least two distinct sets of waves, a portion of each of which overlap temporally at said receiver system or overlap physically by propagating in said touch sensitive portion along axes which are substantially non-orthogonal;

said receiver system determining a position or a waveform perturbing characteristic of a touch on said touch sensitive portion.

2. The touch sensor according to claim 1, wherein said at least two distinct sets of waves from said touch sensitive surface propagate along different sensing axes.

3. The touch sensor according to claim 1, wherein said at least two distinct sets of waves from said touch sensitive surface are of differing wave propagation modes.

4. The touch sensor according to claim 1, wherein said at least two distinct sets of waves differ in frequency.

5. The touch sensor according to claim 1, wherein said at least two distinct sets of waves are emitted by a common transducer.

6. The touch sensor according to claim 5, wherein said at least two distinct sets of waves are emitted simultaneously.

7. The touch sensor according to claim 1, wherein said transducer system comprises at least one array of transducing elements.

8. The touch sensor according to claim 1, wherein said receiver system comprises at least one array of transducing elements.

9. The touch sensor according to claim 1, wherein said transducer system comprises a single electroacoustic transducer.

10. The touch sensor according to claim 1, wherein said receiver system comprises a single electroacoustic transducer.

11. The touch sensor according to claim 1, wherein at least two distinct wave paths intersect at a non-perpendicular angle.

12. The touch sensor according to claim 1, further comprising a reflective array, situated along a path, said path not being a linear segment parallel to a coordinate axis of a substrate in a Cartesian space, a segment parallel to an axial axis or perpendicular to a radial axis of a substrate in a cylindrical space, nor parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere;

13. The touch sensor according to claim 1, wherein said at least two distinct wave paths share a common segment wherein substantially all of the wave energy of each wave path travel.

14. The touch sensor according to claim 1, wherein said at least two distinct wave paths do not share a common segment wherein substantially all of the wave energy of each wave path travel.

15. The touch sensor according to claim 1, further comprising a reflective array intersecting acoustic paths, having a two dimensional Fourier transform with at least one useful spacing vector component.

16. The touch sensor according to claim 1, further comprising at least two reflective arrays intersecting acoustic paths, each having a two dimensional Fourier transform with one useful spacing vector component.

17. The touch sensor according to claim 1, further comprising a superposed reflective array intersecting acoustic paths, having a two dimensional Fourier transform with at least two useful spacing vector components.

18. The touch sensor according to claim 1, wherein said transducer system comprises a superimposed array.

19. The touch sensor according to claim 18, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves scattered at differing angles.

20. The touch sensor according to claim 18, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves of differing frequencies.

21. The touch sensor according to claim 18, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves of differing propagation modes.

22. The touch sensor according to claim 1, wherein said receiver system comprises a superimposed array.

23. The touch sensor according to claim 22, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves scattered at differing angles.

24. The touch sensor according to claim 22, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves of differing frequencies.

25. The touch sensor according to claim 22, wherein said superimposed array has a two dimensional Fourier transform with at least two useful spacing vector components for waves of differing propagation modes.

26. The touch sensor according to claim 1, wherein said at least two distinct sets of waves intersect at angles between about 10 and 80 degrees.

27. The touch sensor according to claim 1, wherein said at least two distinct sets of waves include a Rayleigh wave and a horizontally polarized shear wave.